Nitrogen dissociation during RF sputtering of Lipon electrolyte for all-solid-states batteries

Small size and high power density secondary batteries are desired for a large number of applications based on miniature wireless devices and sensors that need to be compatible with the microelectronic fabrication technology. This fact resulted in the development of solid electrolytes, like lithium phosphorus oxynitride (Lipon), that can be compacted with the anode and cathode electrodes in an all-solid-states structure where the nitrogen incorporation is considered one of the key parameters for controlling the ionic conductivity. In this work the nitrogen dissociation during RF sputtering of Lipon films in nitrogen gas is investigated by mass appearance spectrometry, optical emission spectroscopy and electrostatic probes and the results are correlated with electrochemical properties of the films. Low pressure and moderate power are found to be most beneficial for the growth of good quality films under a high dissociation rate for nitrogen.

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